

---

---

कृषि ट्रैक्टर — चुने हुए कार्यकारिता मापदंडों  
की अनुशंसाएँ  
( पाँचवां पुनरीक्षण )

**Agricultural Tractors —  
Recommendations on Selected  
Performance Characteristics**

( Fifth Revision )

ICS 65.060.10

© BIS 2022



भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

मानक भवन, 9 बहादुर शाह ज़फ़र मार्ग, नई दिल्ली - 110002

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR  
MARG NEW DELHI - 110002

[www.bis.gov.in](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

October 2022

Price Group 10

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Machinery and Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was first published in 1987 and subsequently revised in 1999, 2007, 2014 and 2019.

In this fifth revision, the following major changes/modifications have been made on the basis of the comments received from Ministry of Agriculture, Central Farm Machinery Training and Testing Institute, Budni and Tractor Mechanization Association:

- a) This standard is applicable to agricultural & forestry tractors fitted with diesel engine only as per the modified scope.
- b) Definition of repeat test has been modified along with the inclusion of provision in case of specified breakdown.
- c) The specifications of Maximum operating temperature (°C) for engine oil, Maximum operating temperature (°C) for coolant, drawbar performance, power lift and hydraulic performance, Roll over protective structures given in Table 1 have been modified as per latest technological development and Industrial practices.

The composition of the Committee responsible for the formulation of this standard is placed at Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

## AGRICULTURAL TRACTORS — RECOMMENDATIONS ON SELECTED PERFORMANCE CHARACTERISTICS

### 1 SCOPE

**1.1** This standard specifies the recommendations on selected performance characteristics of agricultural and forestry tractors fitted with diesel engines only.

**1.2** This standard covers the following:

- a) Criteria for acceptance of the tractor for the purpose of subsidy/financing.
- b) Tolerances on the values declared by the manufacturer and in certain cases minimum/maximum values of the performance characteristics and statutory requirements under the relevant act(s) of the agricultural tractors.
- c) Criteria/options not expressly mentioned in this standard cannot be taken into consideration for determining variants/models of tractors.
- d) Criteria for providing administrative extension and technical extension to earlier tested tractor model(s). Criteria/options not expressly mentioned in this standard cannot be taken into consideration for determining administrative/technical extension of tractors.

### 2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

<i>IS No.</i>	<i>Title</i>
4468 (Part 1) : 1997	Agricultural wheeled tractors — Rear-mounted three-point linkage: Part 1 Categories 1, 2, 3 and 4 ( <i>fourth revision</i> )
4468 (Part 2) : 1993/ISO 730-2	Agricultural wheeled tractors — Three-point linkage: Part 2 Category 1 N (Narrow Hitch) ( <i>third revision</i> )
4931: 1995	Agricultural tractors — Rear mounted power take off types 1, 2 and 3 ( <i>third revision</i> )
5994: 1998	Agricultural tractor — Test code ( <i>third revision</i> )
8132 : 1999/ISO 3600	Tractors and machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation ( <i>first revision</i> )
11082 : 1984	Technical requirements of agricultural tractors for wet land cultivation
11821 (Part 1) : 2019/ISO 3463	Tractors for agriculture and forestry — Roll-over protective structures (ROPS): Part 1 Dynamic test method and acceptance conditions ( <i>second revision</i> )
11821 (Part 2) : 2018/ISO 5700	Method of Tests and acceptance conditions for protective structures of agricultural tractors: Part 2 Static Test ( <i>second revision</i> )
12062 : 1987	Method of measurement of exhaust smoke emitted by agricultural Tractors
12239 (Part 2) : 1999	Tractors and Machinery for agriculture and forestry — Technical means for ensuring safety : Part 2 Tractors ( <i>first revision</i> )
12343 : 2021	Agricultural tractors — Operator's seat technical requirements ( <i>first revision</i> )
12362 (Part 3) : 1994/ISO 6489-3	Agricultural Vehicles — Mechanical connections on towing vehicles: Part 3 Tractor drawbar ( <i>first revision</i> )

- 12953 : Drawbar for agricultural tractors —  
1990 Link type — Specification
- 13154 : Automotive vehicles — Tyres for  
2015 agricultural vehicles and their trailers  
— Specification (*first revision*)

### 3 TERMINOLOGIES

For the purpose of this standard the following definitions shall apply.

**3.1 Confidential Test** — The test conducted for providing confidential information on the performance of tractor whether ready for commercial production or not, or to provide any special data that may be required by the manufacturer/applicant.

**3.2 Commercial Test** — The tests conducted for establishing performance characteristics of tractor that are ready for commercial production or already in commercial production.

**3.2.1 Initial Commercial Test (ICT)** — The tests conducted on indigenous or imported prototype of tractor which are ready for commercial production or already in commercial production.

**3.2.2 Batch Test (Conformity of Production)** — The tests conducted on tractors which have already undergone initial commercial test and are being manufactured/sold commercially in the country.

Specifications of model submitted for batch testing, shall be same as reported in the ICT report unless adversely commented upon and/or recommended for change in ICT test report itself. In the other relevant circumstances, specifications of model submitted for batch testing, shall be same as reported in the Administrative Extension/Technical Extension report.

**3.2.3 Repeat Test** — The test that may be conducted, if so requested by the applicant, on the tractor to confirm its not meeting the evaluative requirements of this standard. This may also be conducted if there is/or;

- a) 1st critical breakdown;
- b) 3rd major breakdown provided this breakdown has not repeated itself; and
- c) 6th minor breakdown provided it has not repeated itself.

Further in case of breakdown, repeat test may be carried out on the same sample. Results of both the tests shall be reported in the Test Report. The corollary is that if as a result of repeat test, the same breakdown

does not occur, for acceptance purpose the breakdown under question is deemed to be not occurred.

**3.2.4 Administrative Extension** — If there are changes on the tractor such as vehicle colour, decals, design of sheet metal parts, make or model denominations for marketing purposes etc subject to the tractor performance is not affected. Therefore, the testing station which carried out the original test can issue an 'administrative extension report'. The administrative extension report shall contain a reference to the original test report.

**3.2.5 Technical Extension** — When technical modifications occur on the tractor, the tractor performance may be affected. Examples of such modifications are:

- a) Changes to the engine, its components, and its exhaust after treatments;
- b) Changes in efficiency of the hydraulics;
- c) Changes in gearbox design, ratios staying the same; and
- d) Changes in manufacturing some tractor components (front axle, power train), etc.

Such modifications shall result in the drafting of a technical extension report where these modifications will be highlighted. This technical extension report shall contain a reference to the original test report.

Conditions of validation of a technical extension test report are the following:

A power take-off test of the modified tractor shall have shown that all modifications did not result in a change of PTO-torque, fuel consumption, and reagent consumption (*if applicable*) measured in the original test by more than  $\pm 5\%$  for PTO power or engine power  $> 26$  kW,  $\pm 10\%$  for PTO power or Engine power  $\leq 26$  kW compared to the original test at manufacturer's rated engine speed and/or maximum power.

In order to check other effects of the modifications, further performance verifications may be required by the Testing Institute. The results shall be reported in the technical extension report.

*Explanation:*

For the purpose of interpretation of Administrative Extension and Technical Extension as mentioned in **3.2.4** and **3.2.5** respectively of this standard, the expression

“performance” shall be taken to mean as performance of the tractor, in its entirety, during (1) Power take-off/Engine Tests, (2) Drawbar Tests, (3) Hydraulic performance tests, (4) Brake Tests, (5) Turning & Clearance diameter, (6) Centre of gravity, (7) Noise Level, (8) Water proof test.

### 3.3 Evaluative Requirements

**3.3.1** Requirements under this category are the ones which are mandatory for acceptance of the tractor for the purpose of subsidies/financing.

### 3.4 Non Evaluative Requirements

Requirements under this category are the ones which are not mandatory for acceptance of the tractor for the purpose of subsidies/financing. However, the authorized testing institute shall observe the performance for these requirements and record in the test report.

**3.5 CMVR** – The Central Motor Vehicles Rules under the *Motor Vehicles Act*, 1988.

## 4 ACCEPTANCE CRITERIA FOR PERFORMANCE CHARACTERISTICS

The tractor may be accepted for the purpose of subsidy/financing if it meets all the evaluative requirements provided in Table 1 and number of breakdowns should not exceed as given in Clause 5.1. This is however subject to the provision of repeat test which can be conducted for once only. Performance characteristics of tractor along with the tolerances with respect to the declared values and in certain cases minimum/maximum values are given in Table 1.

**4.1** In case of a parameter not meeting evaluative requirements of this standard, the ‘repeat test’ as defined in 3.2.3 may be conducted. In case of a parameter not meeting evaluative requirements of this standard even after the repeat test, the manufacturer shall withdraw the tractor from test and ‘withdrawn’ commercial test report shall be released by the testing

authority. Subsequently, the manufacturer shall offer a fresh sample for complete initial commercial test again.

## 5 ACCEPTANCE CRITERIA IN CASE OF BREAKDOWNS/DEFECTS

**5.1** The tractor may be accepted subject to the following conditions:

<i>Sl No.</i>	<i>During Initial Commercial Test</i>	<i>During Batch Test</i>
i)	There is no ‘critical breakdown’ during the course of testing.	There is no ‘critical breakdown’ during the course of testing.
ii)	There are not more than 2 major breakdowns and neither of them should be of repetitive nature.	There are not more than 1 major breakdown.
iii)	There are not more than 5 minor defects during the test and neither of them should be of repetitive nature.	There are not more than 3 minor defects during the test and neither of them should be of repetitive nature.
iv)	In no case, the total number of breakdowns should exceed five that is, (2 major + 3 minor) or (1 major + 4 minor) or 5 minor breakdowns.	In no case, the total number of breakdowns should exceed four that is, (1 major + 3 minor) or 4 minor breakdowns.

**Table 1 Parameters Applicable for Qualifying Minimum Performance Criteria**  
(Clause 4)

SI No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
<b>i)</b>	<b>PTO Performance</b>				
a)	Maximum power under 2 h test, kW Maximum engine power 2 h test, in case of PTO shaft is not provided, (kW)	Evaluative	To be declared by Manufacture	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power or engine power $> 26$ kW, $\pm 10\%$ for PTO power or Engine power $\leq 26$ kW.	—
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	-do-	—
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	-do-	should not be more than 10% of declared value	—
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	-do-	$\pm 8\%$	—
e)	Back-up torque, percent	Evaluative	Should be <i>Min</i> 12%	Nil	—
f)	Maximum operating temperature (°C): 1) Engine oil	Evaluative	To be declared by manufacturer	Nil	The declared value should not exceed the <i>Max</i> value specified by the oil company and the observed value under natural ambient/high ambient condition should not exceed the declaration.

Table 1 (Continued)

Sl No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
	2) Coolant/cylinder liner temperature, in case of air cooled engine	Evaluative	To be declared by manufacturer	Nil	Observed value should not exceed the declared value or boiling point of coolant at radiator cap pressure whichever is lower. The boiling point of the coolant at radiator pressure shall be provided by the applicant.
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at <i>Max</i> power under natural ambient conditions.	Nil	The value would be based on the test conducted under natural ambient condition
h)	Smoke level, (m <sup>-1</sup> )	Evaluative	<i>Max</i> light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR).	Nil	<i>Max</i> Smoke level shall be reported out of 6 readings tested as per IS 12062 and observed value should be well within the required limits.
<b>ii)</b>	<b>Drawbar performance</b>				
a)	Maximum drawbar pull with ballast corresponding to 15% wheel slip or 7% track slip, kN	Non Evaluative	<i>Min</i> 70% of static mass with ballast	Nil	—
b)	Maximum drawbar pull without ballast or with standard ballast corresponding to 15% wheel slip or 7% track slip, (kN)	Evaluative	In case of tractors having total static mass $\geq 1\,500$ kg, <i>Min</i> 70% of static mass of tractor without ballast or with standard ballast, as the case may be. In case of light weight tractors having $\leq 1\,500$ kg total static mass of tractor, <i>Min.</i> 65% of static mass of tractor without ballast or with standard ballast, as the case may be.	Nil	—

Table 1 (Continued)

Sl No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
c)	Maximum drawbar power without ballast or with standard ballast as the case may be, kW	Evaluative	<p><i>Min</i> 80% of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass &gt; 1 500 kg.</p> <p><i>Min</i> 75% of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having <math>\leq</math> 1 500 kg total static mass of tractor.</p> <p><i>Min</i> 75% of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.</p>	Nil	—
d)	For tractors fitted with air conditioned/heated cabin: Maximum drawbar power without ballast, or with standard ballast as the case may be, kW	Evaluative	<i>Min</i> 70% of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1 500 Kg.	Nil	—
e)	Maximum transmission oil temperature (°C)	Evaluative	To be declared by the manufacturer.		The declared value should not exceed the recommendation by the oil manufacturer. The observed value should not exceed the declared value throughout the drawbar test.
iii)	<b>Power lift and hydraulic pump performance</b>				
a)	Maximum lifting capacity throughout the range of lift, (kN):				
	1) At hitch points	Evaluative	To be declared by the manufacturer.	Should not be less than 90% of declared value.	—



Table 1 (Continued)

Sl No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
	2) With the standard frame	Evaluative	The lift capacity should at least be 24 kg/PTO kW and it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft.	Nil	—
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute, (mm)	Non Evaluative	The observed value should not exceed 50 mm.	Nil	—
<b>iv)</b>	<b>Brake performance at 25 kmph travel speed</b>				
a)	Maximum stopping distance at a force equal to or less than 600 N on brake pedal with road ballast, (m):				
	1) Cold brake	Evaluative	10 m	Nil	—
	2) Hot brake	Evaluative	10 m	Nil	—
b)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever, N	Evaluative	Yes/No	Nil	Based on the test conducted, Yes/No as applicable should
<b>v)</b>	<b>Noise measurement</b>				
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR requirement in force	Nil	—
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR requirement in force	Nil	—
c)	Amplitude of mechanical vibrations at :	Non Evaluative			
	1) Foot rest (Left and Right)	Non Evaluative	100 microns <i>Max</i>	—	—
	2) Seat (with driver seated)	Non Evaluative	100 microns <i>Max</i>	—	—
	3) Steering control wheel	Non Evaluative	100 microns <i>Max</i>	—	—
<b>vi)</b>	<b>Air cleaner oil pull over</b>	Non Evaluative	0.25% <i>Max</i>	Nil	—
<b>vii)</b>	<b>Haulage requirements</b>				
a)	Gross mass of the trailers, (tonne):	Non Evaluative	(To be specified by Manufacturer)	—	—
	1) Two wheel	Non Evaluative	(To be specified by Manufacturer)	—	—
	2) Four wheel	Non Evaluative	(To be specified by Manufacturer)	—	—
b)	Distance travelled / litre of fuel consumption, (km/l):	Non Evaluative	—do—	—	—

Table 1 (Continued)

Sl. No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
c)	Fuel consumption (ml/km/tonne):	Non Evaluative	—do—	—	—
<b>viii)</b>	<b>Wetland cultivation (To be done if recommended)</b>				
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS 11082. No water and/or mud ingress in the identified assembly given in column 2.	—	—
	1) Clutch assembly			—	—
	2) Brake housings			—	—
	3) Front axle hubs			—	—
	4) Engine oil			—	—
	5) Transmission oil			—	—
<b>ix)</b>	<b>Safety features</b>				
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulics pipes (as per IS 12239 (Part 2))	—	—
b)	Lighting arrangement	Evaluative	As per CMVR	—	—
c)	Seating requirements (Tractors having more than 1 150 mm rear track width)	Non Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	—	—
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	—	—
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (Part 1) (As amended from time to time)	—	—
f)	Specifications of linkage drawbar	Non-Evaluative	Should meet the requirements of IS 12953 (as amended from time to time)	—	—
g)	Specifications of swinging drawbar (wherever fitted)	Non Evaluative	Should meet the requirements of IS 12362 (Part 3) (as amended from time to time)	—	—

Table 1 (Continued)

Sl No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
h)	Audible warning signal on tractor	Evaluative	If tractor travel speed in reverse gear exceeds 20 kmph, an audible warning signal on tractor shall get activated.	Nil	—
x)	Labelling of Tractors Provision of labelling plate	Evaluative	A sticker to the effect that “operating the tractor beyond 20 kmph speed in reverse gear is not safe” should be prominently displayed.	—	Digit 01-12 in box No. 1 for MM will represent the month and next two digit in the box No. 2 for YY will represent the year of manufacturing
			Should conform to the requirements of CMVR along-with declared value of PTO in kW, Specific fuel consumption (SFC) corresponding to maximum power in g/kWh and year of manufacture in numerical form <table border="1"><tr><td>MM</td><td>YY</td></tr></table>		
MM	YY				
xi)	Discard limit for, (mm)				
a)	Cylinder bore diameter	Evaluative	(To be specified by the manufacturer and supported by the printed literature)	—	—
b)	Clearance between piston & cylinder liner at skirt	Non Evaluative	—do—	—	—
c)	Piston diameter	Non Evaluative	—do—	—	—
d)	Ring end gap	Evaluative	—do—	—	—
e)	Ring groove clearance	Evaluative	—do—	—	—
f)	Diametrical clearance of main bearings	Evaluative	—do—	—	—

Table 1 (Concluded)

Sl No.	Characteristics	Category (Evaluative/Non Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
g)	Diametrical and axial clearance of big end bearings (However, if not possible due to design constraint then small end bearing)	Evaluative	—do—	—	—
h)	Crankshaft end float	Evaluative	—do—	—	—
j)	Clearance between king pin and bush,(mm)	Non Evaluative	—do—	—	—
k)	Clearance between center pin and bush,(mm)	Non Evaluative	—do—		
<b>xii)</b>	<b>Literatures</b>				
a)	Operator manual	Evaluative	The printed literature in booklet form should be provided as per IS 8132 and should submit along with the test sample.	—	—
b)	Parts Catalogue	Evaluative		—	—
c)	Workshop/Service manual	Evaluative		—	—
<b>xiii)</b>	<b>Fitment of Roll Over Protective Structure (ROPS)</b> for tractors having more than 1 150 mm rear track width	Evaluative if fitted	ROPS should meet the requirement of IS 11821 or OECD code or equivalent International Standard	—	As per CMVR
<b>xiv)</b>	<b>Standard accessories</b>	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	—	—
<b>xv)</b>	<b>Accessories (Optional)</b>	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	—	—

**5.2** In case of immediate consequential failures resulting from a single defect/breakdown, the primary single defect/breakdown shall only be counted. Here immediate refers to the part directly connected with the failed/broken part.

**5.3** Replacement of gaskets, seals, 'O' rings etc other than the defective parts during repair, dismantling and re-assembly of any aggregate shall not be considered as breakdown.

**5.4** Categorizations of defects in terms of 'Critical', 'Major' and 'Minor' for various sub-assemblies/parts are provided in the Annex A, B and C.

## **6 GUIDELINES FOR TECHNICAL EXTENSION**

**6.1** In case the fresh sample is submitted/required for carrying out technical extension, the model will have to be ascertained as being the same model as tested earlier (under initial commercial test), by the following checks:

- a) Specification as given in the relevant chapter of the relevant ICT Test Report of the tractor;
- b) Two hour maximum PTO power test under natural ambient conditions; and
- c) Nominal speed.

**6.2** In case of request received for technical extension for certain parameters of the sample, the testing authority may carry out other relevant test(s) also in consultation with the applicant.

**6.3** If a sample is accepted for technical extension and during test period or subsequently (before release of test report), it is found not being the same model as tested earlier under ICT, the further test on the sample would be stopped and applicant shall withdraw the sample from test. However, withdrawn test report on tests already carried out shall be released under commercial test.

## **7 TEST REQUIREMENTS**

**7.1** The initial commercial test (ICT) of tractor shall be made compulsory to meet the requirements of field worthiness of the tractor.

**7.2** The field test duration for initial commercial test will be 35 h with plough and rotavator operations including wetland cultivation, if applicable and for batch test no field test will be conducted, if no major breakdowns are observed in the field test during ICT of the tractor.

**7.3** The timelines for first batch test (conformity of production) after release of initial commercial test report and subsequent batch tests after the previous batch test shall be carried out as per the issued guidelines by Department of Agriculture and Farmer Welfare.

**7.4** The variant model(s) are also subjected to batch test (conformity of production) and shall be regulated as per 7.3.

**7.5** If the manufacturer declares that any particular model is not in production and will never be taken up for production in future, it will have to declare the last chassis number of tractor produced. Only after this declaration, manufacturer may declare one of the variant model as a base model.

Further, if the manufacturer declares that any particular model will cease to be produced & will never be taken up for production after a particular chassis number, the said chassis number shall be declared by the manufacturer. Only after this declaration, manufacturer may declare one of the variant model as a base model. The testing authority shall select at random declared variant model from the production line in place of base model for Initial Commercial Test. The tests shall be carried out as per IS 5994 on the selected test sample.

ICT of this variant model will be compared with the variant report already released for the same parameter/criteria as the batch report is compared from ICT.

## **8 CRITERIA FOR DETERMINING NEW MODEL/VARIANT MODEL OF TRACTORS**

### **8.1 Base Model**

A base model shall be defined as the one, which has defined specifications as reported in the Initial Commercial Test report. Manufacturer will specify the base model along with list of variants, which could be added or deleted or supplemented to arrive at variants of the subject base model. The tractor will be tested as per relevant Indian Standard and Initial Commercial Test (ICT) Report shall be released.

**8.1.1** If manufacturer desires the following features shall be declared as an optional features which are not affecting tractor performance with base model, same shall be inspected/verified on the same sample under test and shall be incorporated in Initial Commercial Test (ICT) report. The optional features shall be

deemed to be fitted on all the variant(s) of the base model.

The optional features components declared on the base model should be submitted along with the ICT tractor submission. In case of non-submission of optional

features components at the time of ICT, the manufacturer shall withdraw the tractor within 30 days and test fees deposited shall stands forfeited.

The declaration or fitment of optional features shall not be allowed during the Batch Test.

### 8.1.2 Optional Features of Base Model

Sl No.	Optional features of Base model	Tests/Inspection that will be required on addition of the features on Base model
i)	Power assisted/Manual steering systems	Inspection against the CMVR requirements
ii)	Type of actuation systems for brake and clutch (mechanical/hydraulic/pneumatic)	For brakes, inspection against the CMVR requirements. In other cases, only physical inspection and measurement of actuation forces
iii)	Change of PTO shaft Type I or II by replacing the PTO ends only and without change in engine to PTO speed ratio	Inspection against relevant standards
iv)	Single/dual/dry/wet/independent clutch/increase in size of clutch without change in clutch housing, flywheel housing etc provided the wheel base and engine to PTO speed remains same	—
v)	Different tyre sizes – front and rear: One step up/lower tyres (radius index of tyre shall remain within $\pm 50$ mm) and are used on the recommended rim as per IS 13154 ITTAC manual. In case of 4WD models selection of front tyres to maintain slip ratio within 5% between the front and rear tyres	Nominal speed test
vi)	Addition/deletion of creep gears range modules without changing other speeds	Nominal speed test
vii)	Location of hydraulic pump without change in drive speed	Physical inspection
vii)	Location and routing of exhaust system without change in declaration of back pressure	Physical inspection
ix)	Change in type of front dead axle from fixed to adjustable/swept/straight axle and vise-versa Change in track width and/or wheel base	Turning ability test
x)	Change in model/group combination number of FIP/Governor due to addition/deletion of cold starting kit/change in fuel cut-off (on-off) knob/switch without change in engine performance	Subject to the production of emission certificate.

### 8.2 Variants

The variant model(s) may be arrived from a base model by the addition/deletion/supplementation of any one or more of the features given in Table 2. The variants shall be subjected to additional test(s) as stated against each feature of variant (*see* Table 2).

**8.3** The manufacturer may submit the application for testing of variant model along with the base model. In case during test the variant model gets disqualified within the definition of variant model, the manufacturer shall withdraw the sample from test. However, withdrawn test report on tests already carried out shall be released under commercial test.

If the base model does not meet the evaluative requirements including breakdowns, the variant model will stand disqualified. The manufacturer shall withdraw the sample from test. However, withdrawn test report on tests already carried out shall be released under commercial test.

All the variants which are tested or submitted along with the base model for test shall appear in the test report of the base model.

**8.4** For variants, the following checks shall be made (on fresh sample only) for conformity of sample as being the same as tested earlier:

- a) Specification as given in the relevant chapter of the relevant ICT Test Report of the tractor;
- b) Nominal speed test; and
- c) Two hour maximum PTO power test under normal ambient conditions.

**8.5** For variants, which can be converted at test site, the variant model can be derived by adding or deleting the variant features in the same sample of base model and if any tests are required, the same can be conducted on the derived variant tractor. If

manufacturer desires, a separate variant tractor may be submitted and the relevant tests may be carried out.

**8.6** Wherever only physical inspection on the variant tractor is required as per the Table 2, the inspection can also be carried out at manufacturer's works, in consultation with the testing authority.

**8.7** Beyond the above definition of base model and its variants, other changes would be considered as model change.

**8.8** Difference between base model, variant and a new model on the basis of engine parameters is given in Table 3.

## **9 CRITERIA FOR CONVERSION OF NATURE OF TEST FROM CONFIDENTIAL TO COMMERCIAL**

If the tests on a machine submitted for confidential test have been conducted as per the relevant commercial test procedure in all respects, then on the request in writing of the applicant, the testing authority, after satisfying himself may permit conversion of nature of test from 'confidential' to 'commercial'.

**Table 2 Determination of Variants**  
(Clause 8.2 and 8.6)

Sl No.	Features of Variant	Additional Tests/Inspection that will be Required on the Feature of Variant
(1)	(2)	(3)
i)	Single/dual/dry/wet/independent clutch/change in size of clutch, with/without change in engine to PTO speed ratio and/or wheel base.	PTO performance test under natural ambient condition. If the wheel base is changed by more than $\pm 50$ mm, then turning ability test and centre of gravity test to be conducted
ii)	Specification of dry to wet air cleaner, its location.	Air cleaner oil pull over test as per IS 5994 if the air cleaner is changed from dry to wet type or combination thereof.
iii)	Location and routing of exhaust system/provision of spark arrester.	Physical inspection
iv)	Different types of gear box (with or without synchronizers, constant mesh etc without change in basic construction of transmission), provided the gear ratio and speed remained the same and should have separate model/identification for each type of gear box.	Nominal Speed Test

SI No.	Features of Variant	Additional Tests/Inspection that will be Required on the Feature of Variant
(1)	(2)	(3)
v)	Addition of number of speeds with add-on modules and/or modifications in gear ratios $\pm$ 20% of the nominal speed of the highest both forward & reverse gear speeds measured on base model.	Nominal speed test
vi)	Fitment/change of engine accessories such as air compressors, radiators and oil coolers.	a) If the total coolant (water) capacity of radiator is reduced by more than 20% that of base model or the oil cooler is removed, then engine/PTO test under high ambient condition to be conducted. b) No additional test required only physical inspection in other cases.
vii)	Type of brake system such as drum, disc, Oil immersed; type of actuation system; and change in brake lining area and material.	Brake test and inspection as per the relevant Standard and CMVR requirements.
viii)	Three point linkages, rear or front mounted.	Inspection as per relevant standards and hydraulic performance test
ix)	Location and/or change in type of PTO shaft(s)/number of PTO speeds.	Inspection as per relevant standards and PTO Performance test under natural ambient condition.
x)	2 WD or 4 WD drive or vice-versa.	a) Drawbar performance test under unballasted/standard ballast condition is required when base model is 4 WD and variant is 2 WD. b) If the base model is 2 WD and variant is 4 WD then drawbar performance test and noise level test.
xi)	Location and type of hydraulic pump drive.	Physical inspection. No test is required if the pump speed remains within $\pm$ 25% of the base model. Otherwise, hydraulic performance test.
xii)	Positioning of hydraulic sensing mechanism (like lower link, top link, etc).	Physical verification and field performance (dry land only)
xiii)	Change in the location and type of final reduction or brake location without affecting the nominal speeds meeting at SI No. v).	—
xiv)	Type of FIP – Inline/rotary/common rail/CRDI .	a) No test if the declared power is within the tolerance specified in col 3 of Table 3. b) If declaration of power exceeds tolerance specified in column 3 of Table 3, then PTO performance test.
xv)	Providing Cabin with air conditioning / heating unit.	Drawbar performance test under unballasted condition and noise level test
xvi)	Change in make/model/Engine displacement/rated engine speed/aspiration of engine provided declaration in maximum PTO power is within $\pm$ 20% of the declared value of base model.	2 hour maximum PTO power test under natural ambient condition.



**Table 3 Permissible change in engine characteristics in the variants.**  
(Clause 8.8)

SI No. (1)	Parameters (2)	Base Model (3)	Variant (4)	New Model (5)
i)	Engine operating principle (spark/compression ignition, four stroke)	No change	No change	Change
ii)	Number and arrangement of Cylinders	No change	No change	Change
iii)	Maximum PTO power (Maximum engine power in case PTO shaft is not provided)	No change in power declaration	Change in power declaration should not exceed $\pm 20\%$ of the declared values of base model.	Increase in power declaration exceeding 20% of the declared values of base model.
iv)	Engine displacement	Variation in Engine displacement provided there is no change in power declaration.	Variation in engine displacement provided change in power declaration does not exceed $\pm 20\%$ of the declared values of base model.	Variation in engine displacement provided increase in power declaration exceeding 20% of the declared values of base model.
v)	Rated engine speed	Variation in rated engine speed provided there is no change in power declaration.	Variation in rated engine speed provided change in power declaration does not exceed $\pm 20\%$ of the declared values of base model.	Variation in rated engine speed provided increase in power declaration exceeding 20% of the declared values of base model.
vi)	Naturally aspirated/turbo charged	Provided there is no change in power declaration.	Provided change in power declaration does not exceed $\pm 20\%$ of the declared values of base model.	Provided increase in power declaration exceeding 20% of the declared values of base model.

**NOTES**

- 1** The term 'declared value' in the above table refers to the declared value of the base model tested under ICT.
- 2** Tractor model name of any variant tractor can be entirely or partially different from base model tractor.
- 3** The manufacturer can opt for model change on the basis of 8.2 even, if the parameters in SI no. iii), iv), v) and vi) are met.
- 4** Every modification in the engine parameters to meet the statutory/regulatory requirements shall be intimated by the manufacturer to the test authority. The test authority may consider that the modifications in engine parameters require further tests or otherwise. No modifications/change in forward speed shall be allowed.

**ANNEX A**  
(Clause 5.4)

**CATEGORIES OF BREAKDOWNS/DEFECTS (TRACTORS)**

**(Critical Breakdowns)**

<b>Codes</b>	<b>Aggregate</b>	<b>Critical Breakdowns</b>	<b>Sub-assembly/Part</b>	<b>Applicable Norms</b>
(1)	(2)	(3)	(4)	(5)
C1	Engine	Engine seizure	Piston or liner or rings	As under column 3 and 4 of critical breakdowns and sub-assembly/part
C2	—do—	—do—	Main or big end bearings	
C3	—do—	Breakage or cracking or bending of	Piston	
C4	—do—	—do—	Connecting rod	—do—
C5	—do—	—do—	Crankshaft	—do—
C6	—do—	Breakage or cracking of	Lubricant oil pump	—do—
C7	—do—	—do—	Fuel injection pump	—do—
C8	—do—	—do—	Governor	—do—
C9	—do—	—do—	Cylinder block	—do—
C10	—do—	—do—	Cylinder head	—do—
C11	—do—	—do—	Valve gears	—do—
C12	Transmission	—do—	Clutch housing	—do—
C13	—do—	—do—	Gear box or differential housing	—do—
C14	—do—	—do—	Axle housing	—do—
C15	Steering System	—do—	Steering gear	—do—
C16	—do—	—do—	Steering shaft	—do—
C17	—do—	—do—	Steering wheel	—do—
C18	—do—	—do—	Steering drop arms	—do—
C19	—do—	—do—	Drag links	—do—
C20	—do—	—do—	Tie rods	—do—
C21	—do—	—do—	Steering knuckles	—do—
C22	—do—	Failure of	Locking mechanism components	—do—

Codes	Aggregate	Critical Breakdowns	Sub-assembly/Part	Applicable Norms
(1)	(2)	(3)	(4)	
C23	Brake system	Breakage or cracking of	Actuating linkage parts or actuating system	—do—
C24	—do—	—do—	Brake housing or drum	—do—
C25	Front Axle	—do—	Front axle	—do—
C26	—do—	—do—	Stub axle	—do—
C27	—do—	—do—	King pin	—do—
C28	—do—	—do—	Front axle support	—do—
C29	—do—	—do—	Pivot pin and lock	—do—
C30	—do—	—do—	Radius rod	—do—
C31	Wheel Equipment	—do—	Wheel hub	—do—
C32	—do—	—do—	Wheel rim	—do—
C33	—do—	—do—	Wheel disc	—do—
C34	Hydraulic	—do—	Hydraulic housing or hydraulic lift cover housing	—do—
C35	Trailer hitch mounting assembly	Breakage or failure of	All elements	—do—

## ANNEX B

(Clause 5.4)

### CATEGORIES OF BREAKDOWNS/DEFECTS (TRACTORS)

#### (Major Breakdowns/Defects)

Code	Aggregate	Major Breakdowns/Defects	Sub-assembly/Part	Applicable Norms
(1)	(2)	(3)	(4)	(5)
Mj1	Engine	Breakage or cracking or bending of	Fan Blade	As under column 3 and 4 of major breakdowns/defects and sub-assembly/part
Mj2	—do—	—do—	Oil sump	—do—
Mj3	—do—	—do—	Water pump	—do—
Mj4	—do—	—do—	Fuel tank	—do—
Mj5	—do—	—do—	Radiator	—do—
Mj6	—do—	—do—	Push rods or rocker arms or valves or valve locks or cam followers or cam shaft	—do—

Code	Aggregate	Major Breakdowns/ Defects	Sub-assembly/Part	Applicable Norms
(1)	(2)	(3)	(4)	(5)
Mj7	—do—	Failure of	Lubrication	—do—
Mj8	Transmission	Breakage or cracking or bending of	Clutch assembly and its components	—do—
Mj9	—do—	—do—	All gearing elements	—do—
Mj10	—do—	—do—	All shaft elements	—do—
Mj11	—do—	Breakage or cracking of	All bearings	—do—
Mj12	—do—	—do—	Levers or forks or rails of gear shifting mechanism	—do—
Mj13	—do—	Breakage or cracking or bending of	PTO Shaft	—do—
Mj14	—do—	Breakage or cracking of	Actuating linkage parts of clutch	—do—
Mj15	Hydraulics	Breakage or cracking or bending of	Pump or its positive drive mechanism or its elements	—do—
Mj16	—do—	—do—	Valves	—do—
Mj17	—do—	—do—	Ram cylinder or piston	—do—
Mj18	—do—	—do—	Lift cover assembly	—do—
Mj19	—do—	—do—	Cross shaft	—do—
Mj20	—do—	—do—	Distributor	—do—
Mj21	—do—	Breakage or cracking of	Suction or delivery pipes	—do—
Mj22	—do—	Breakage or cracking or bending of	Three point linkages	—do—
Mj23	Wheel assembly	Breakage or cracking of	Wheel bearings	—do—
Mj24	Sheet Metal	Breakage or cracking or bending of	Operator seat (structure)	—do—
Mj25	—do—	—do—	Foot rest or foot steps	—do—
Mj 26	—do—	—do—	Rear fender	—do—

## NOTES

- 1 Any breakage / cracking listed above which is repairable without change of component is treated as minor defects.
- 2 The decision whether the concerned part is to be repaired shall be taken on the basis of provisions available in the published literature submitted to the testing authority before the start of tests. In the case of non-availability of the provision in the literature, the matter shall be decided by the testing authority at its discretion.

(Clause 5.4)

**CATEGORIES OF BREAKDOWNS/DEFECTS**  
(Minor Breakdowns/Defects)

Code	Aggregate	Minor Breakdowns/ Defects	Sub-assembly/ Part	Applicable Norms
(1)	(2)	(3)	(4)	(5)
Mn1	Electricals	Malfunctioning	Self starter <sup>1)</sup>	As under column 3 and 4 of minor breakdowns/defects and sub-assembly/part
Mn2	—do—	—do—	Cut out	—do—
Mn3	—do—	—do—	Dynamo <sup>1)</sup> or Alternator <sup>1)</sup>	—do—
Mn4	—do—	—do—	Horn	—do—
Mn5	—do—	—do—	Light signaling system	—do—
Mn6	Engine	Leakage from	Radiator joints	—do—
Mn7	—do—	—do—	Gaskets	—do—
Mn8	—do—	—do—	Seals	—do—
Mn9	—do—	—do—	O rings	—do—
Mn10	—do—	Burst/cracked	High pressure pipe	—do—
Mn11	—do—	Malfunctioning	Fuel injector <sup>1)</sup>	—do—
Mn12	Transmission	Leakage from	Gasket	—do—
Mn13	—do—	—do—	Seals	—do—
Mn14	—do—	Bending of	Levers or rails of gear shifting mechanism.	—do—
Mn15	—do—	—do—	Actuating linkage parts of clutch	—do—
Mn16	Hydraulics	—do—	Gaskets	—do—
Mn17	—do—	—do—	Seals	—do—
Mn18	—do—	—do—	O rings	—do—
Mn19	Hydraulic Brake System	—do—	Gaskets	—do—
Mn20	—do—	—do—	Seals	—do—
Mn21	—do—	—do—	O rings	—do—
Mn22	Wheel Assembly	—do—	Wheel hub	—do—
Mn23	Sheet metal	Crackage	—	—do—
Mn24	System warning gauge	Malfunctioning	Ammeter	—do—
Mn25	System warning gauges	Malfunctioning	Water temperature	—do—
Mn26	—do—	—do—	Engine oil pressure	—do—
Mn27	Hydraulics	—do—	Pump <sup>1)</sup> or its positive drive mechanism <sup>1)</sup>	—do—
Mn28	—do—	—do—	Valves	—do—

Code	Aggregate	Minor Breakdowns/ Defects	Sub-assembly/ Part	Applicable Norms
(1)	(2)	(3)	(4)	(5)
Mn29	—do—	—do—	Ram cylinder or piston	—do—
Mn30	—do—	—do—	Lift cover assembly	—do—
Mn31	—do—	—do—	Cross shaft <sup>1)</sup>	—do—
Mn32	—do—	—do—	Distributor <sup>1)</sup>	—do—
Mn33	—do—	Breakage of	Check chains	—do—

NOTE — Malfunctioning marked as ‘<sup>1)</sup>’ above and requires replacement of complete assembly and shall be treated as major defects.

## ANNEX D

(Foreword)

## COMMITTEE COMPOSITION

## Agricultural Machinery and Equipment Sectional Committee, FAD 11

<i>Organization</i>	<i>Representative(s)</i>
ICAR - Central Institute of Agricultural Engineering, Bhopal	DR C. R. MEHTA, DIRECTOR ( <b><i>Chairperson</i></b> )
Agriculture Machinery Manufacturers Association, Pune	DR SURENDRA SINGH
	SHRI S. V. RAJU ( <i>Alternate</i> )
All India Farmers Alliance, New Delhi	DR RAJARAM TRIPATHI
	ADV APURVA TRIPATHI ( <i>Alternate</i> )
Aspee Agro Equipment Private Limited, Mumbai	SHRI JATIN S. PATEL
	SHRI GANGADHAR VARPE
Automotive Component Manufacturers Association of India, New Delhi	SHRI A. A. BADUSHA
	SHRI GIRISH TANAWADE ( <i>Alternate</i> )
	SHRI GANGARAM AUTI ( <i>Alternate II</i> )
Captain Tractors Private Limited, Rajkot	SHRI SHAILASH MOVALIYA
Central Farm Machinery Training and Testing Institute (CFMT and TI), Budni	SHRI P. K. PANDEY
CLAAS India Private Limited, Chandigarh	SHRI C. V. CHIMOTE ( <i>Alternate</i> )
CNH Industrial India Private Limited, Pune	SHRI K. P. SINGH
	SHRI SANTHOSH RAO
	SHRI SUJIT HINGE ( <i>Alternate</i> )
Consumer Guidance Society of India (CGSI), Mumbai	DR SITARAM DIXIT
ICAR - All India Coordinated Research Project on Ergonomics and Safety in Agriculture, Bhopal	DR K. N. AGRAWAL
ICAR - All India Coordinated Research Project on Farm Implements and Machinery (AICRP-FIM), New Delhi	DR C. R. MEHTA
ICAR - All India Coordinated Research Project on Utilization of Animal Energy (AICRP), Bhopal	DR M. DIN
ICAR - Central Institute of Agricultural Engineering, Bhopal	HEAD, AGRI MECHANIZATION, CIAE
	DR U. R. BADEGAONKA ( <i>Alternate</i> )
	DR DILIP JAT ( <i>Young Professional</i> )
	( <i>Alternate II</i> )

Indian Council of Agricultural Research, New Delhi

DR PANNA LAL SINGH

SHRI PRAKASH CHANDRA JENA  
(Alternate)

John Deere India Private Limited, Pune

SHRI ANAND RAJ

SHRI CHANDRASHEKHAR  
DESHMUKH

(Alternate)

Kerala Agro Machinery Corporation Limited (KAMCO), Athani

SHRI P. C. SAJIMAN

SHRI ARUN KUMAR T. K.

(Alternate)

SHRI VIPIN V. PAVANAN (Alternate  
II)

Ministry of Agriculture, Department of Agriculture, New Delhi

SHRI V. N. KALE

SHRI ARVIND MESHRAM (Alternate)

National Innovation Foundation, Delhi

SHRI MAHESH PATEL

National Institute of Plant Health Management (NIPHM),  
Hyderabad

DR VIDHU KAMPURATH P.

MISS M. UDAYA BHANU (Alternate)

North Eastern Region Farm Machinery Training and Testing  
Institute (NER-FMTTI) Biswanath Chariali

DR P. P. RAO

SHRI S. G. PAWAR (Alternate)

SHRI KHAGENDRA BORA  
(Young Professional) (Alternate  
II)

Northern Region Farm Machinery Training and Testing Institute  
(NRFMT and TI), Hisar

DR MUKESH JAIN

SHRI SANJAY KUMAR (Alternate)

Power Tillers Manufacturers Association, Kolkata

SHRI A. R. GANESH KUMAR

Punjab Agricultural University, Ludhiana

DR MANJEET SINGH

DR RAJESH GOYAL (Alternate)

SHRI APOORV PRAKSH (Young  
Professional) (Alternate II)

Southern Region Farm Machinery Training and Testing Institute  
(SRFMT and TI), Anantapur

DR K. K. NAGLE

SHRIMATI T. KAMALABAI (Alternate)



Tractor and Mechanization Association (TMA), New Delhi

SHRI HEMANT DIVEKAR

VOICE, New Delhi

SHRI B. K. MUKOPADHYAY

BIS Directorate General Head (FAD)

SHRIMATI SUNEETI TOTEJA,  
SCIENTIST 'E' AND HEAD (FAD)  
[REPRESENTING DIRECTOR  
GENERAL (*Ex-officio*)]

*Member Secretary*

SHRI DEBASISH MAHALIK

SCIENTIST 'B' (FAD), BIS

**This page has been intentionally left blank**

## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website- [www.bis.gov.in](http://www.bis.gov.in) or [www.standardsbis.in](http://www.standardsbis.in).

This Indian Standard has been developed from Doc No.: FAD 11 (18857).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 <sup>th</sup> Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 <sup>th</sup> Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

**Branches :** AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.